Prepare Mineral Samples for Analysis

Week 1

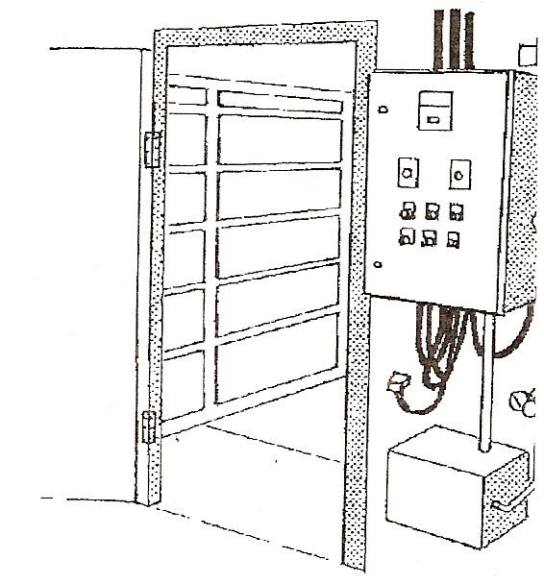
Sample Receival, Sorting, Drying, Splitting & Pulverising

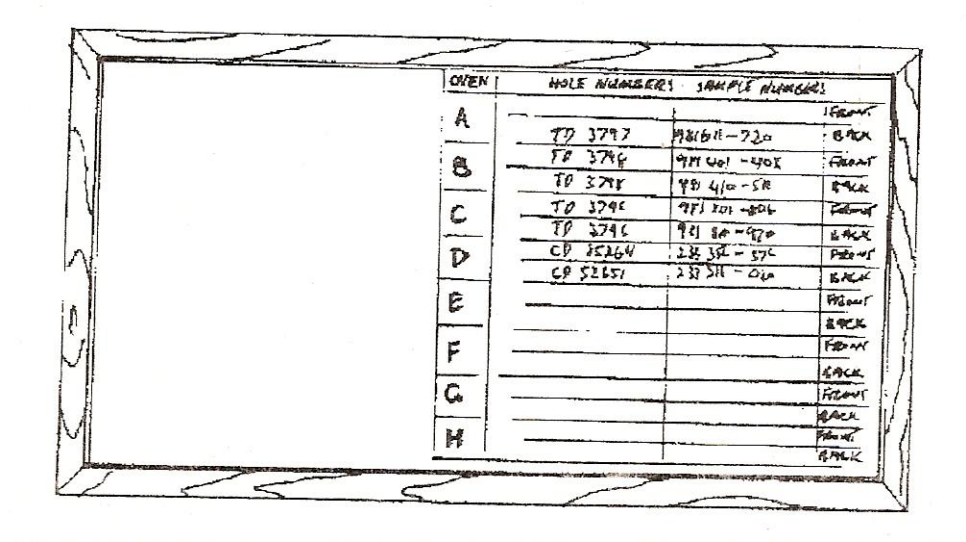
Receival & Sorting

- Sample received via courier and removed either by hand or by forklift if pallets are provided
- Samples sorted according to sample ID, hole number, or other alpha/numeric system
- Samples placed onto drying racks in numerical order
- Racks are labelled stating sample id, mining company and job number

Oven Drying

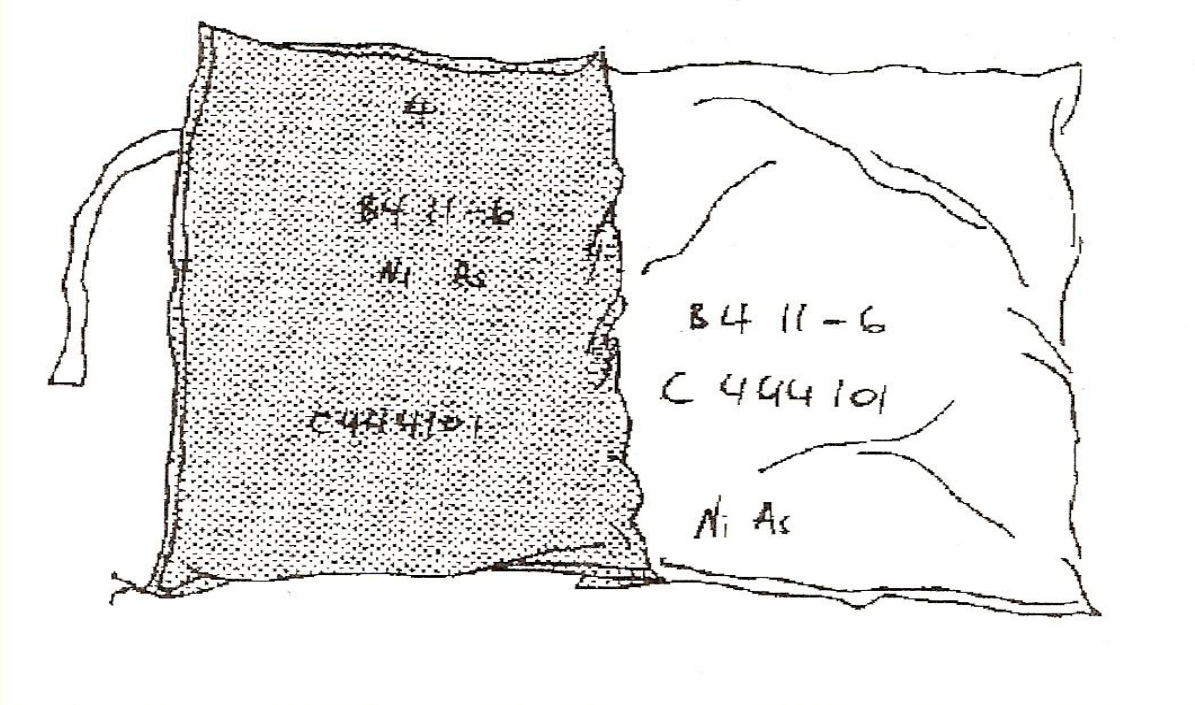
- After sorting, samples placed into a drying oven for 6-12 hours at around 60°C
- Ovens may be gas fired or electric
- Information about samples present in the ovens is displayed on a notice board on the exterior of the oven.
- Typical information found includes sample i.d.'s, mining company, date, job number, person sorted, time in oven, time due out
- The drying duration may be decided by the geologist involved in the original sampling or the laboratory performing the analysis





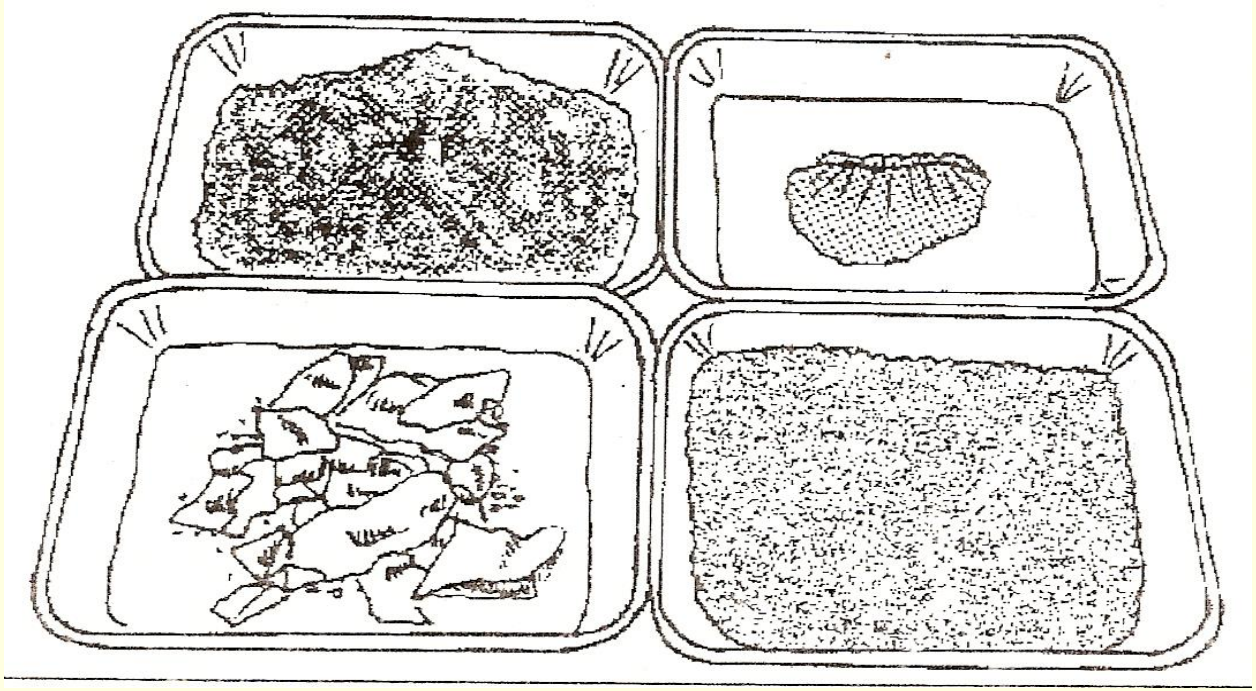
Sample Bags

- Samples usually arrive in calico bags, which are placed inside large plastic bags out in the field
- Plastic bags aren't usually used for direct sample containment in the field due to splitting & tearing
- Plastic sample bags are used <u>after</u> sample drying (e.g. long term storage of the coarse split fraction)



Sample Trays

- Samples can be transferred to aluminium trays prior to drying, or after drying
- Sample bags must accompany samples through the preparation process to ensure sample integrity
- Sample labels are created using a LIMS system soon after sample submission/logging in
- Labels are printed out and stuck on analytical sample bags after the pulverising step

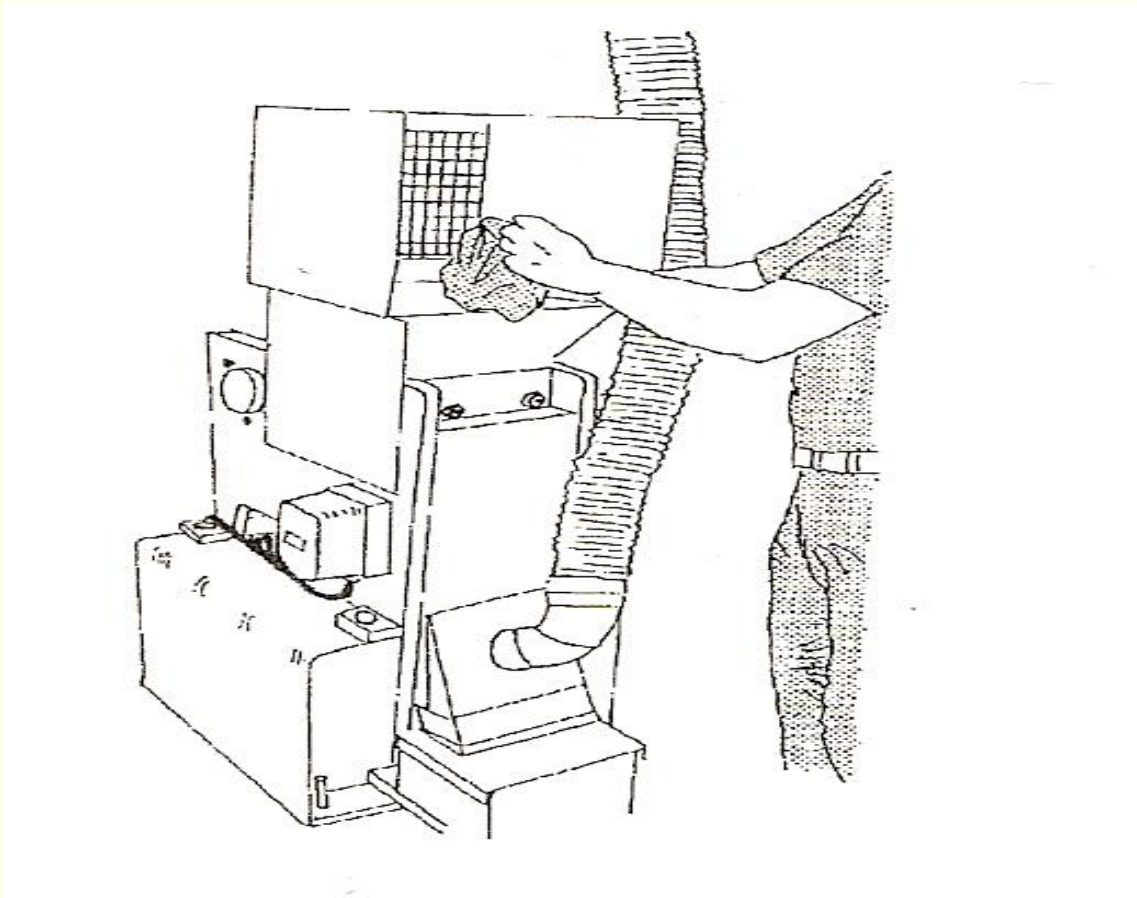


Post oven drying

- Samples removed from oven & wheeled into the preparation area
- Samples are ready for splitting (soil samples) or crushed if rock chip or drill core

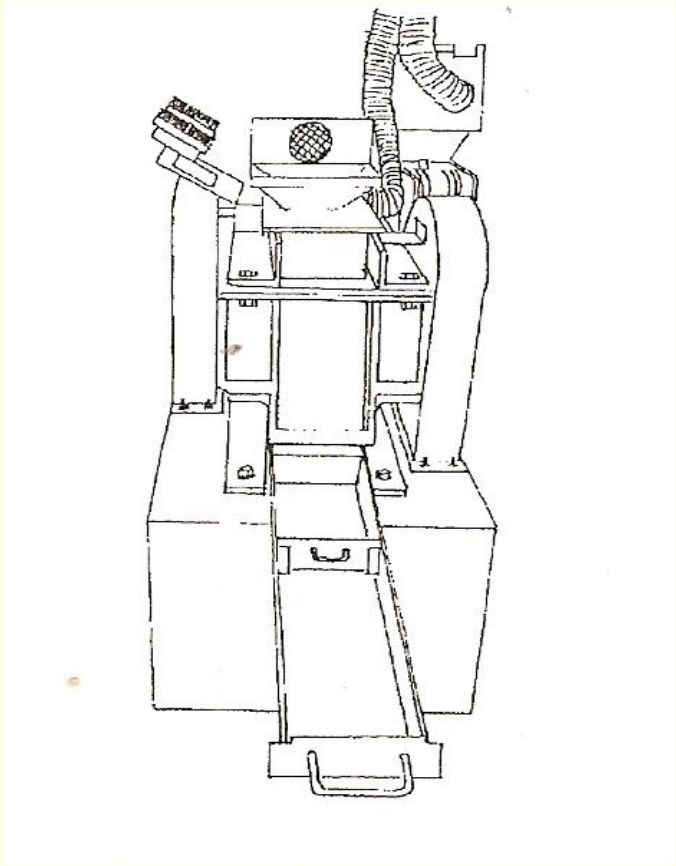
Crushing equipment

- Typical crushing machinery includes:
- Jaw crusher -

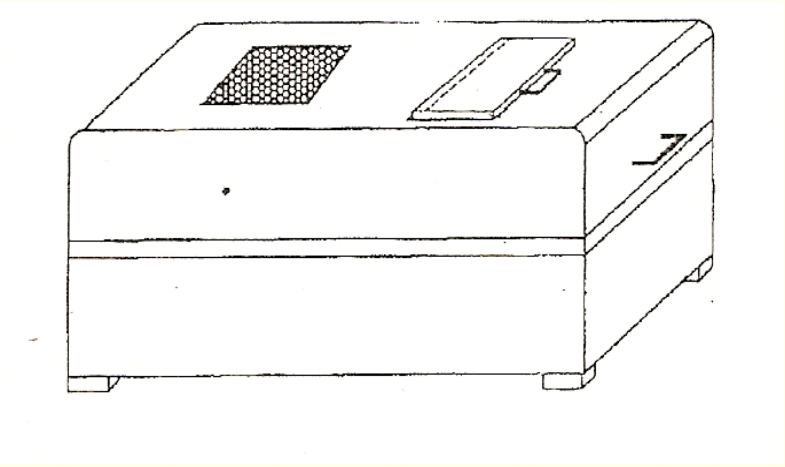


Crushing equipment

- Roller Mill:

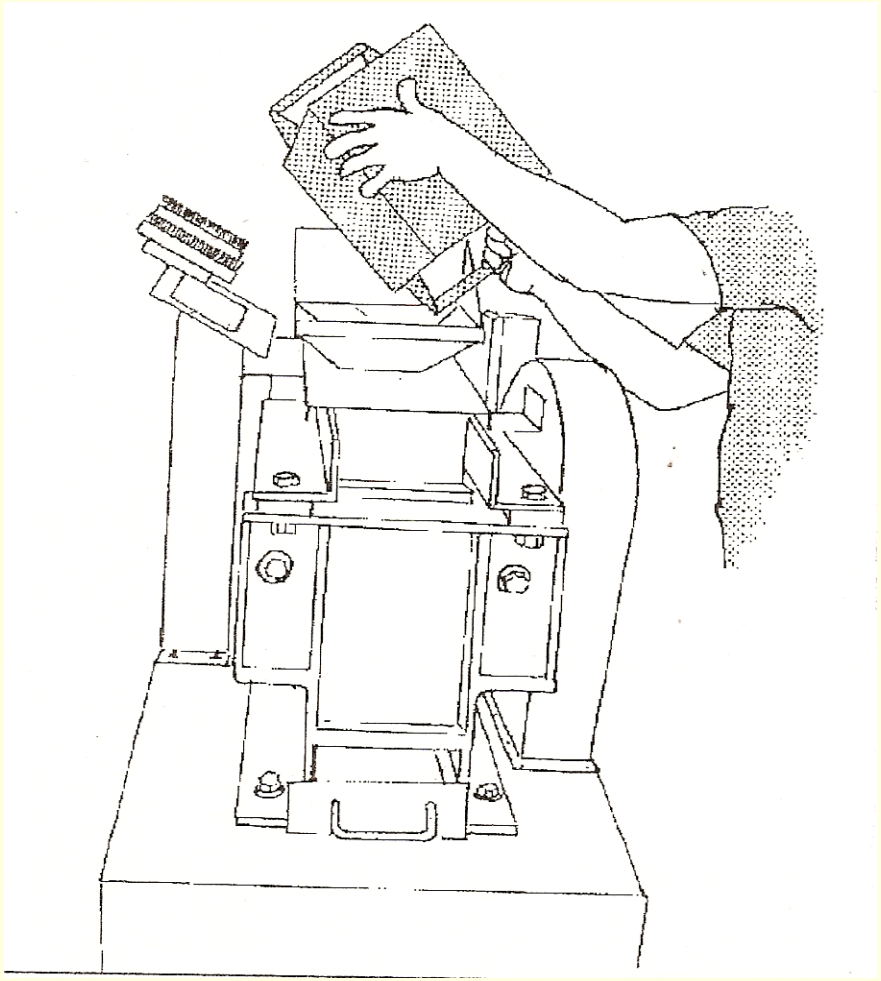


- Boyd Crusher:



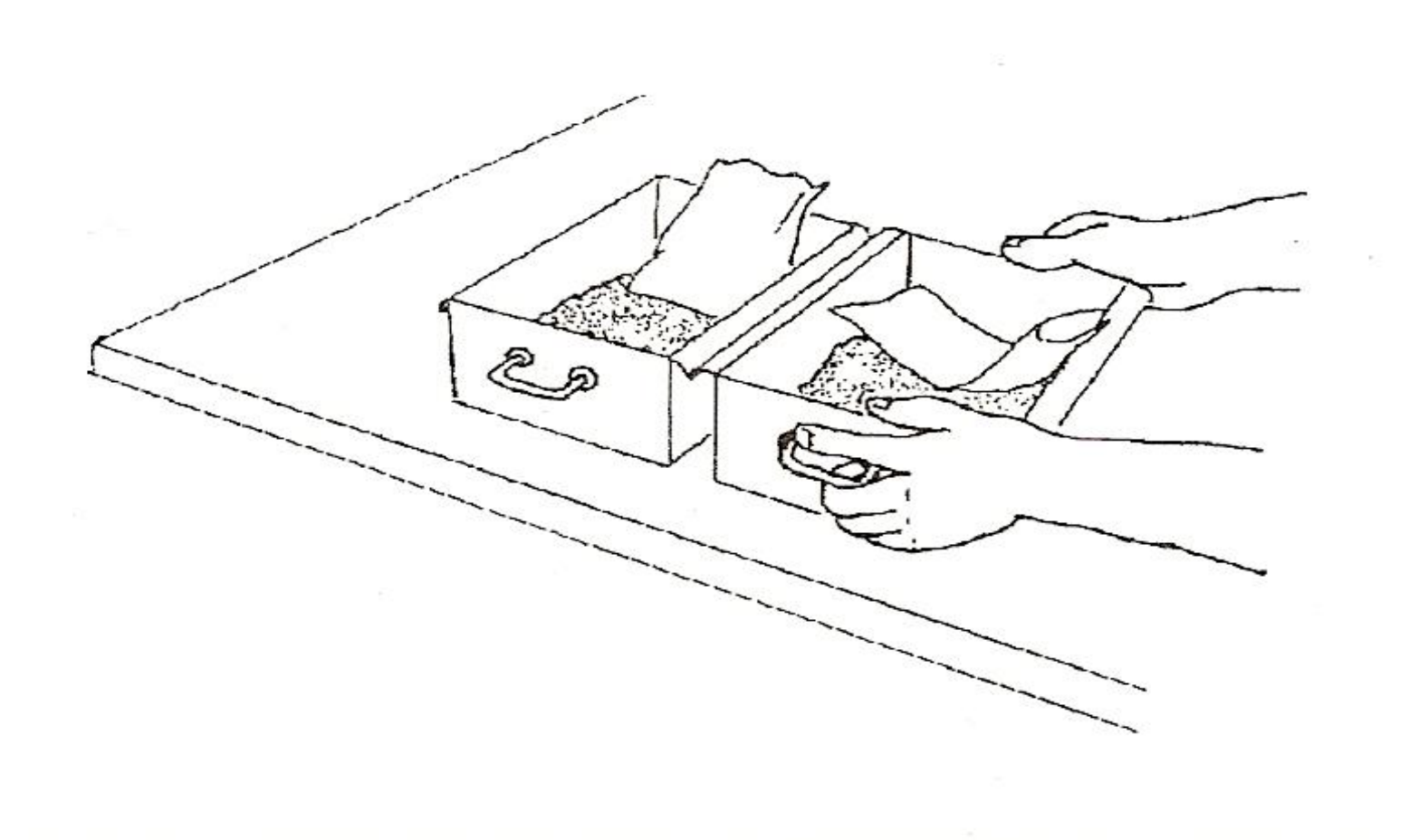
Crushing equipment

- Milling a sample using a Roller Mill -



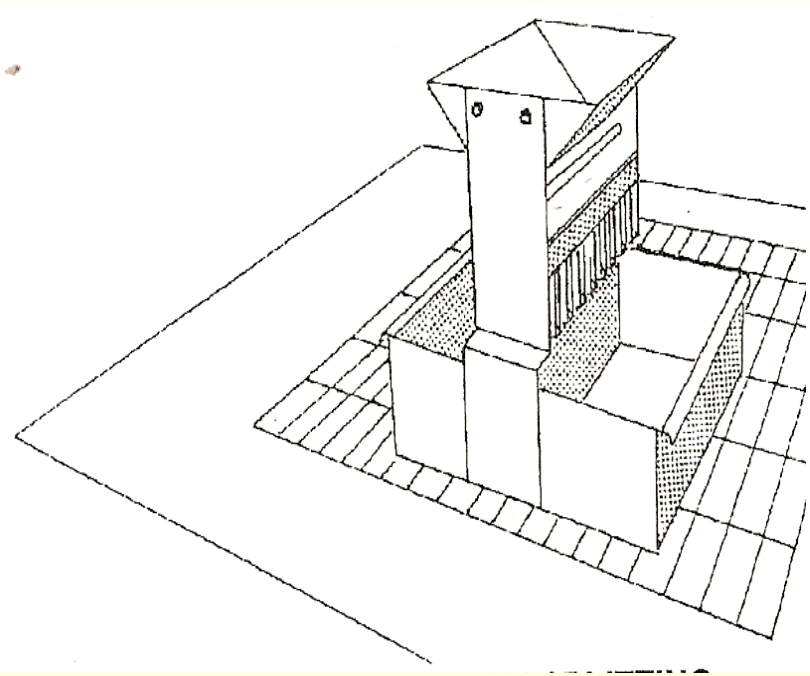
Sample handling

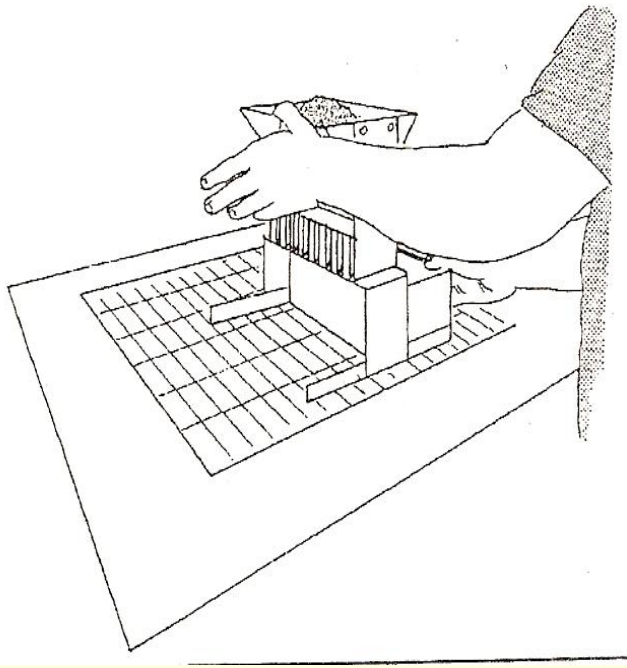
- Sample ready for splitting –



Riffle splitting

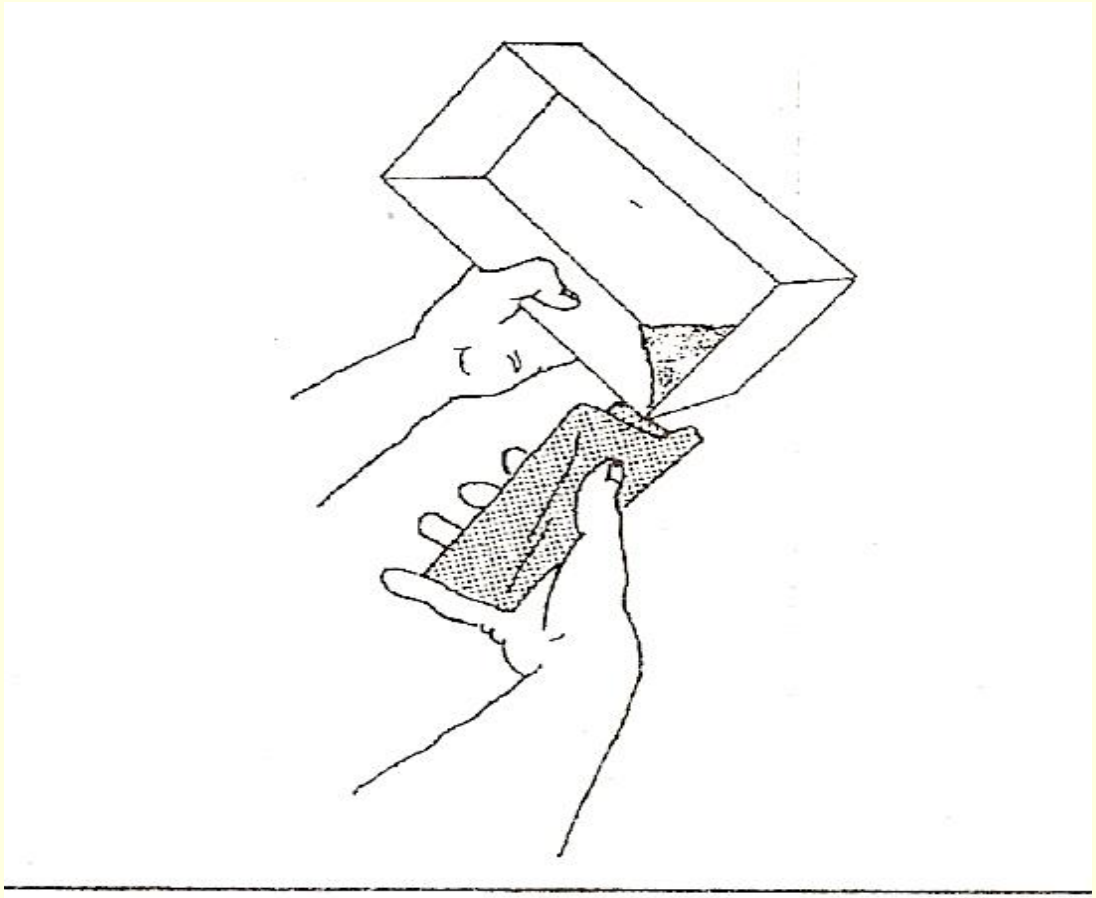
- Diagram (left) showing splitter arrangement if coarse reject is to be kept
- Diagram (right) showing rejection of coarse fraction and keeping of the sample split





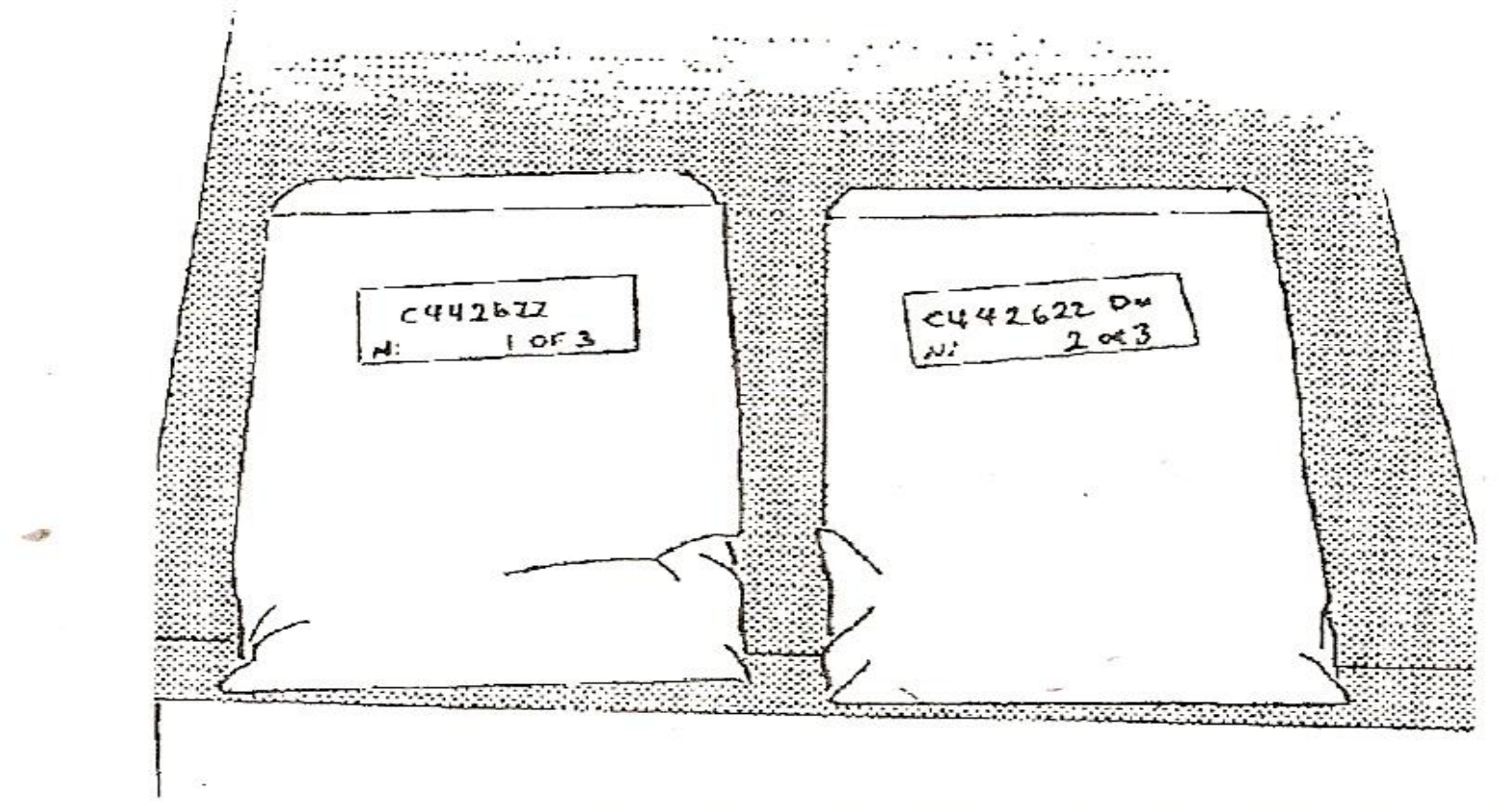
Sample handling

- Transferring the split sample into a sample envelope (packet)



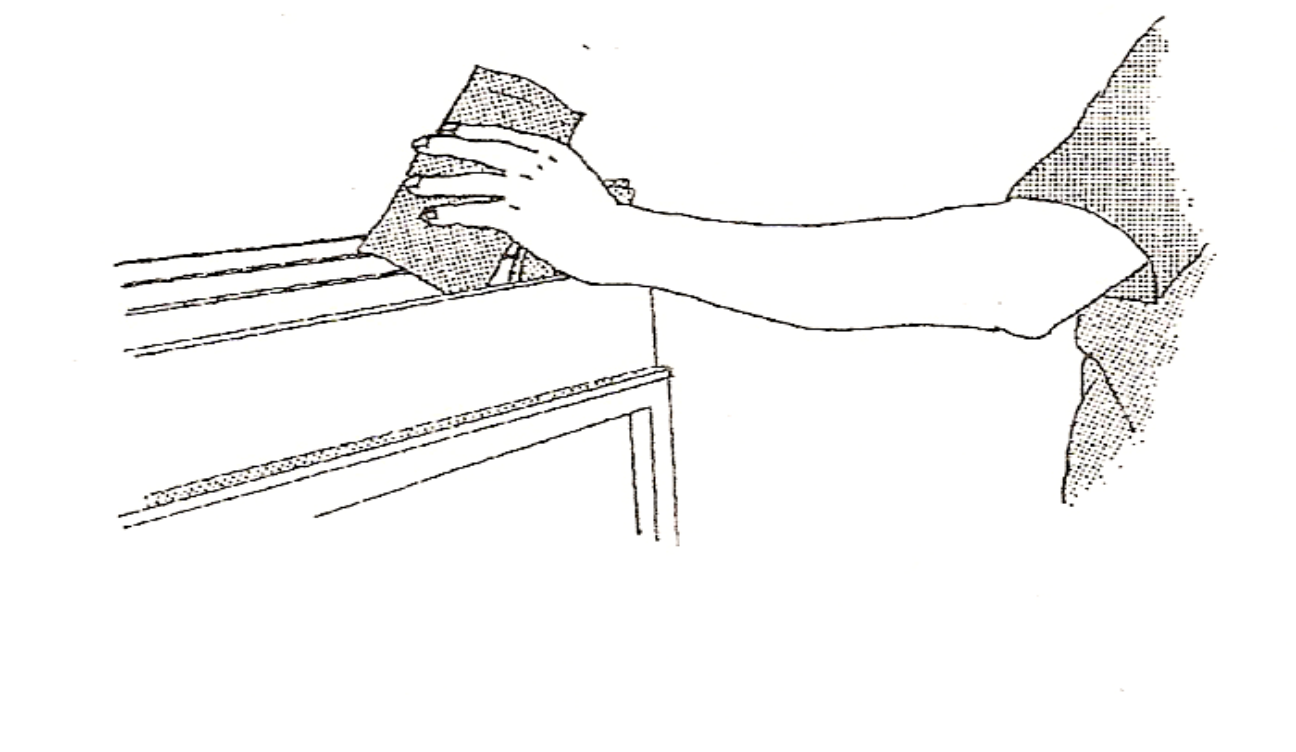
Riffle splitting

- Duplicated split sample –



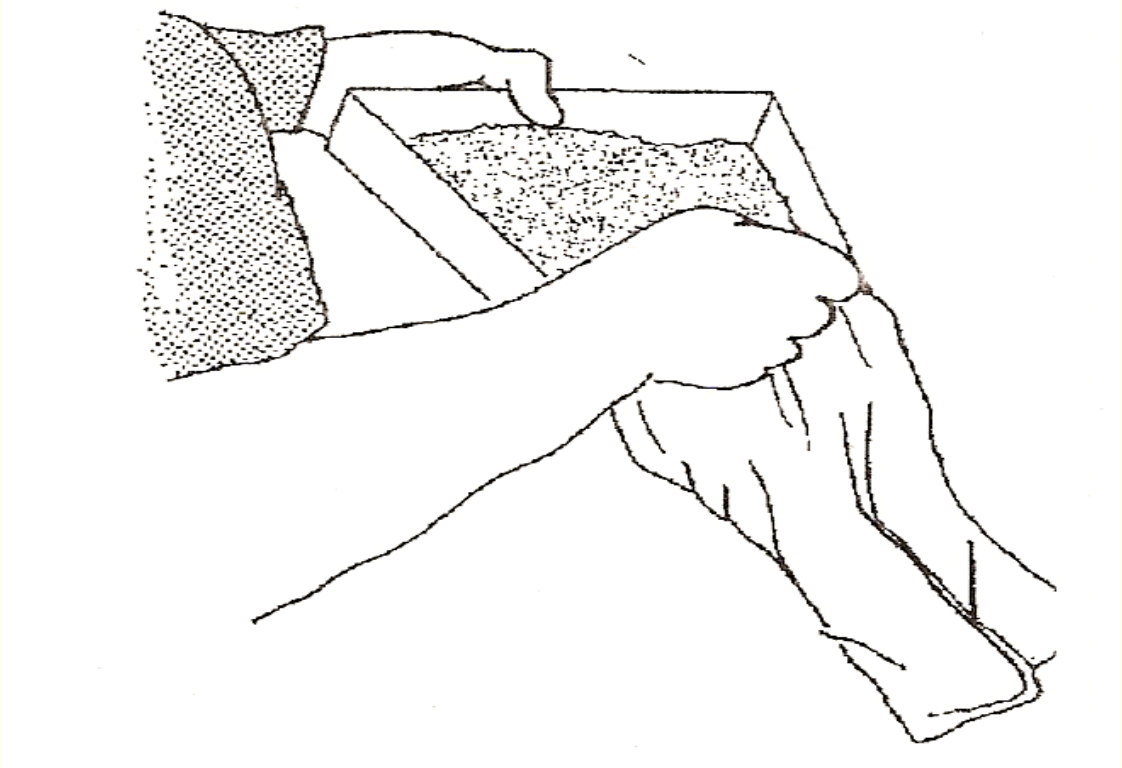
Sample handling

- Placing the split sample envelope into sample holder -



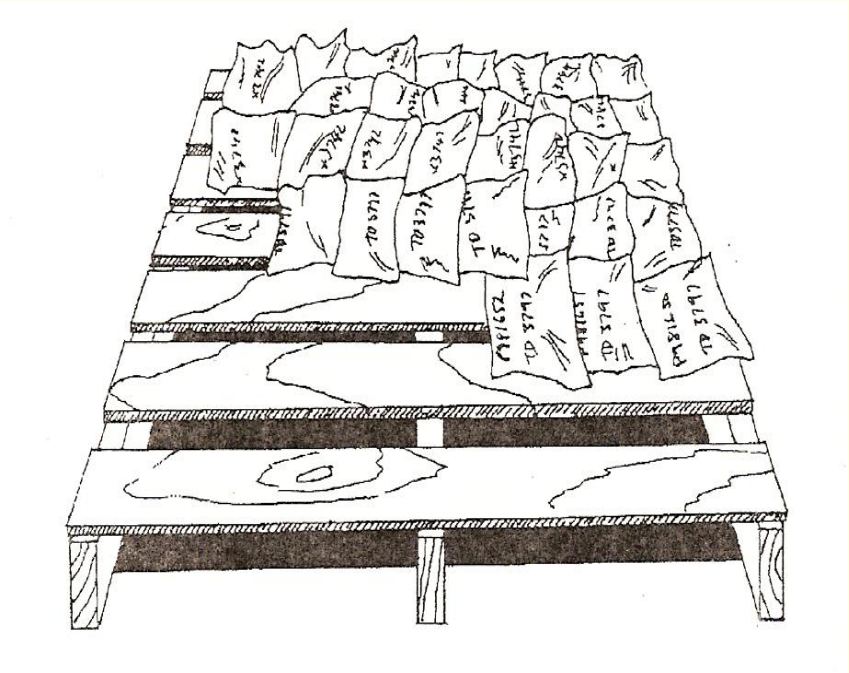
Sample handling

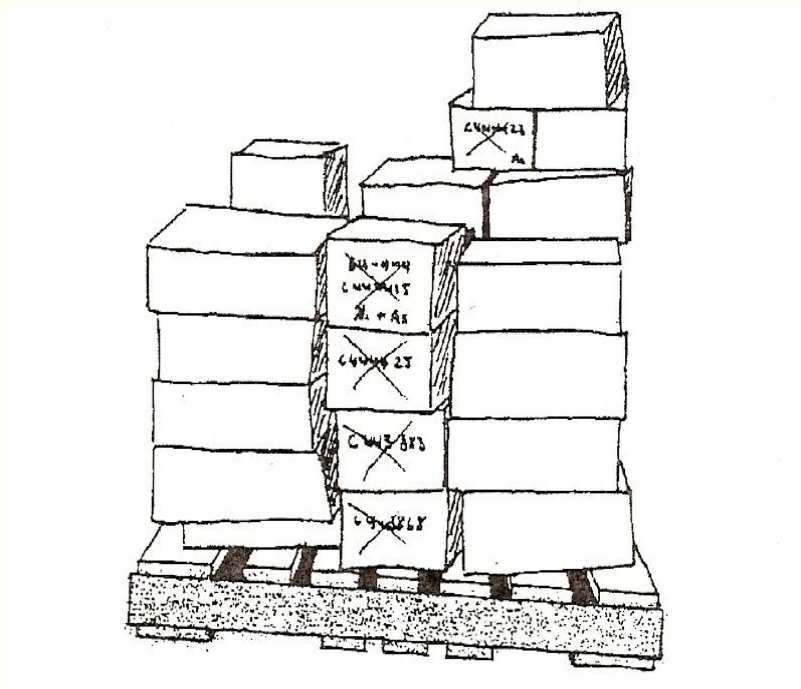
- Bagging the course reject prior to storage-



Coarse reject samples

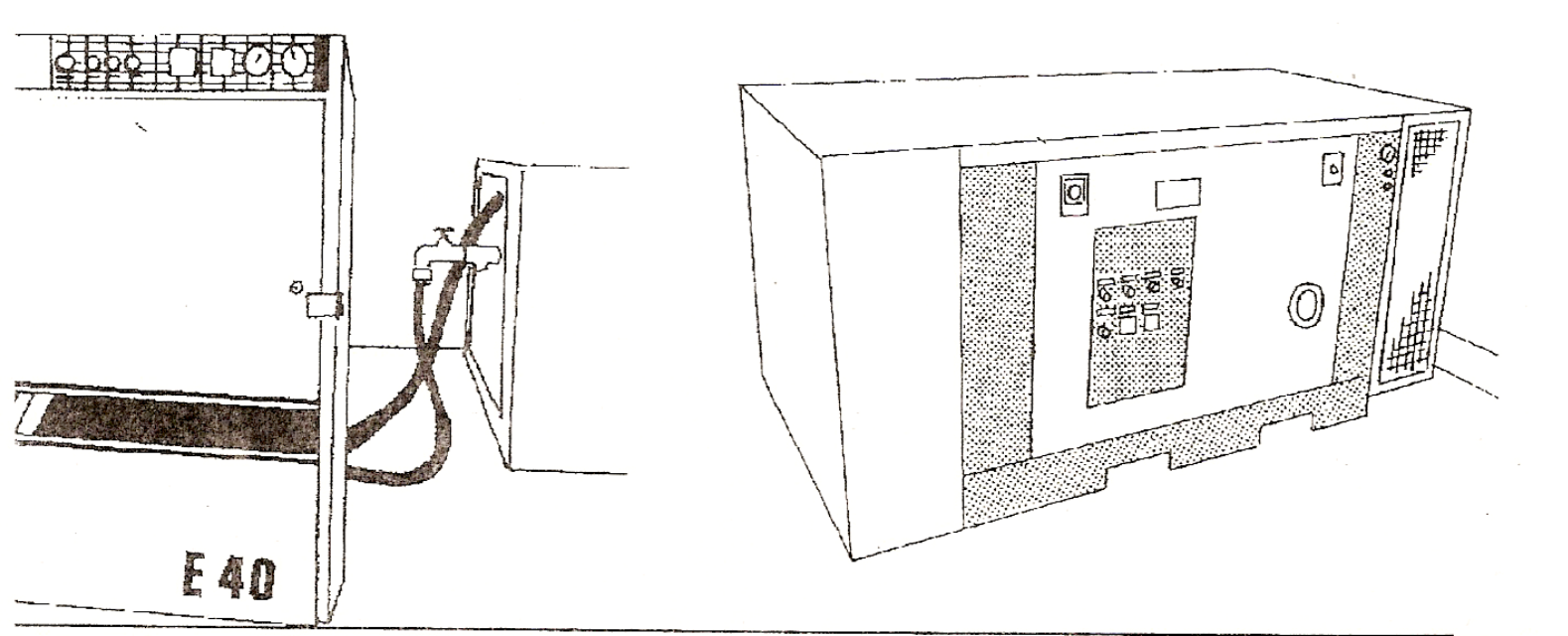
- Once the splitting has occurred, the coarse reject is placed back into it's original sample bag, tied and placed on a pallet or boxed ready for storage and/or further analytical requests from the client





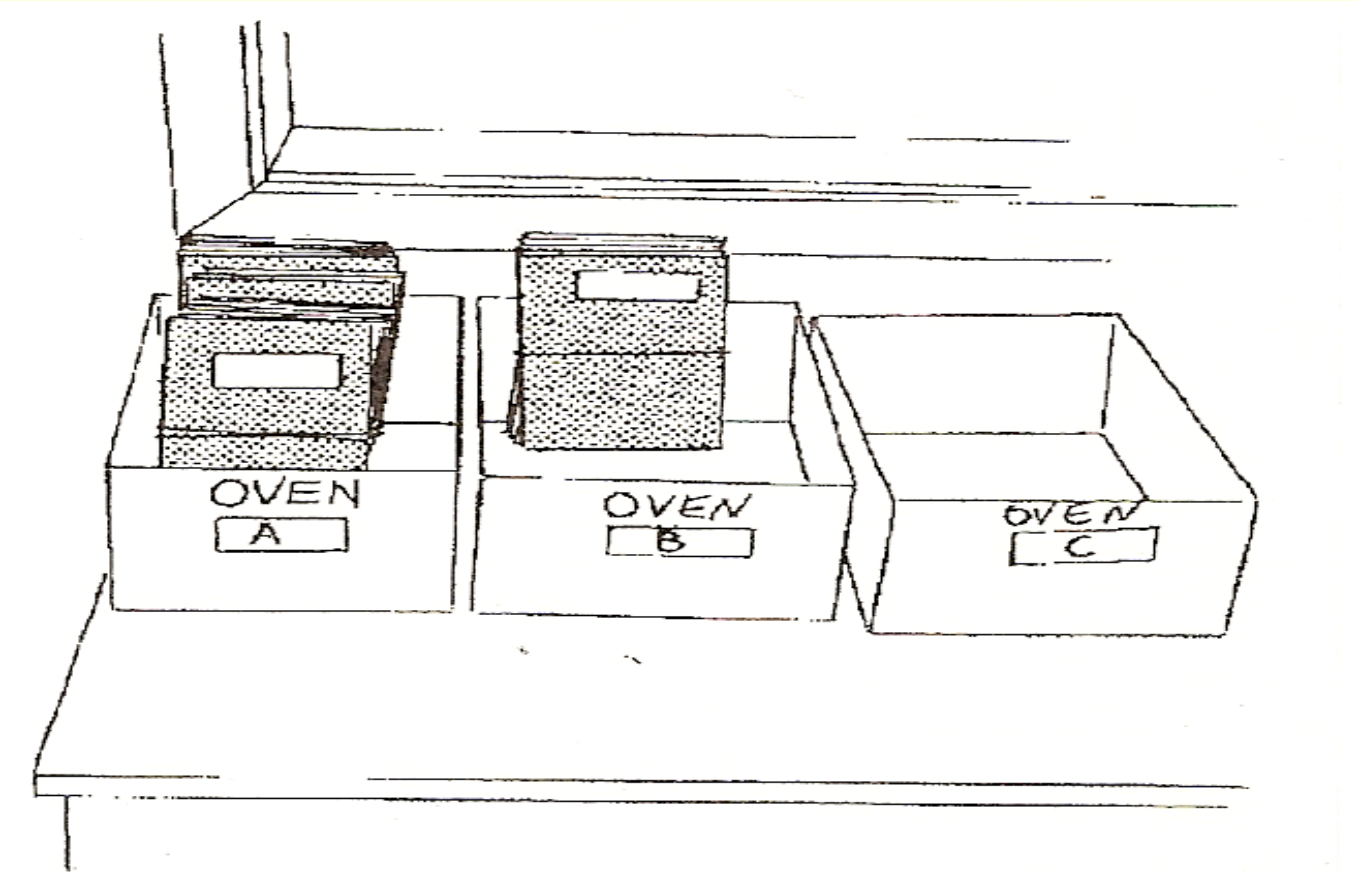
Air Compressors

- A source of air is required in sample preparation to aid in the cleaning of the preparation equipment and in use of the disc pulverisers
- Pulverising bowls and other equipment is blasted with high pressure air to remove particulate matter
- This minimizes cross contamination between samples
- Diagram showing a small (left) and large (right) air compressor types found in sample preparation



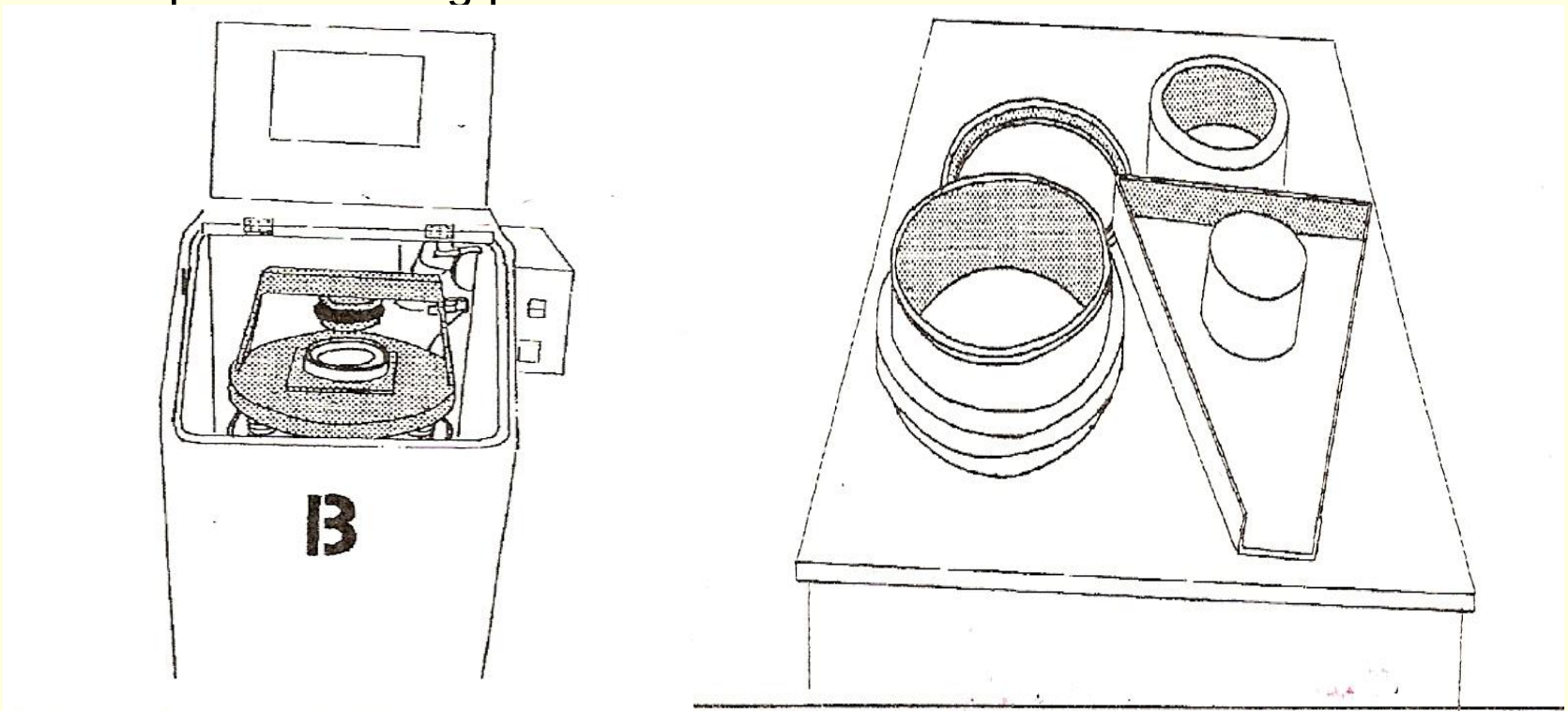
Sample bags

- Envelopes for samples drying in gas ovens prior to addition of pulverised sample-



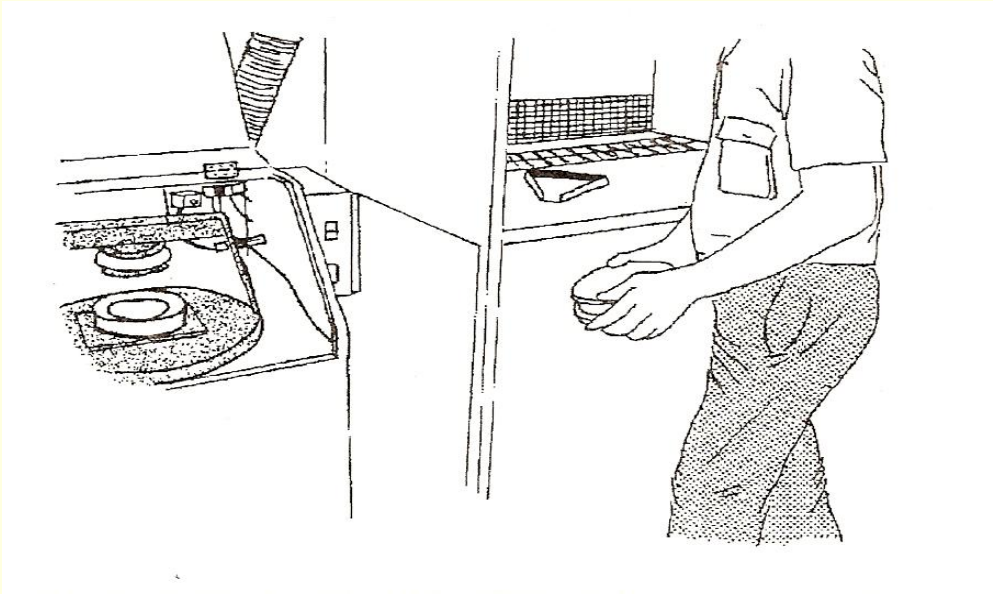
Sample pulverising

- Labtechnics pulverisers are common in most laboratories
- Pulverising equipment used include a bowl containing rings, or a single puck
- Pulverising bowls can come in different sizes, depending on the sample size being pulverised



Sample pulverising

- Sample about to be loaded onto the pulveriser after being transferred from its sample packet into the bowl
- Pulverising can last from 10 seconds up to 3 minutes, depending on sample type
- Samples are pulverised to a fine powder, typically -75µm (95% passing)
- Once pulverised, the sample will be returned back to its sample packet

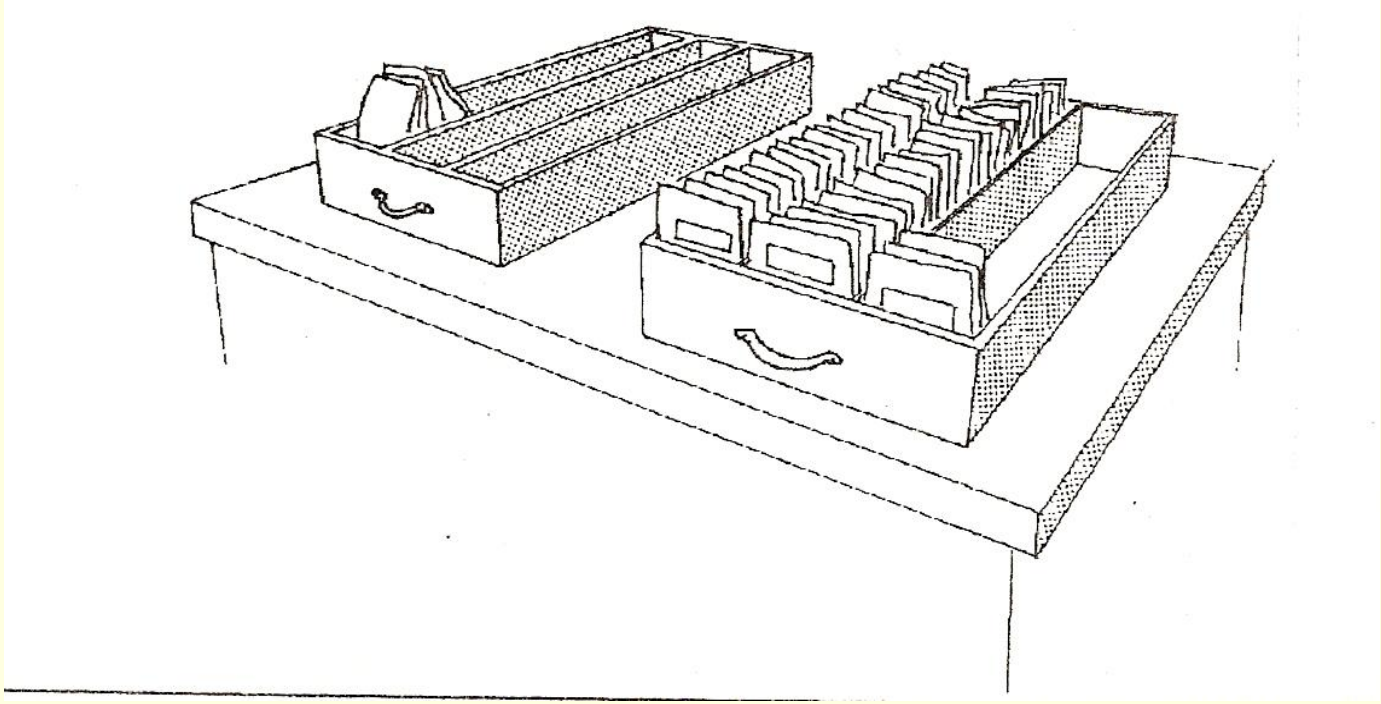


Sample pulverising

- http://www.youtube.com/watch?v=lXdj_D-scPw
- http://www.youtube.com/watch?v=qksYrwhk59U
- http://www.youtube.com/watch?v=KoiLg-oI3yw

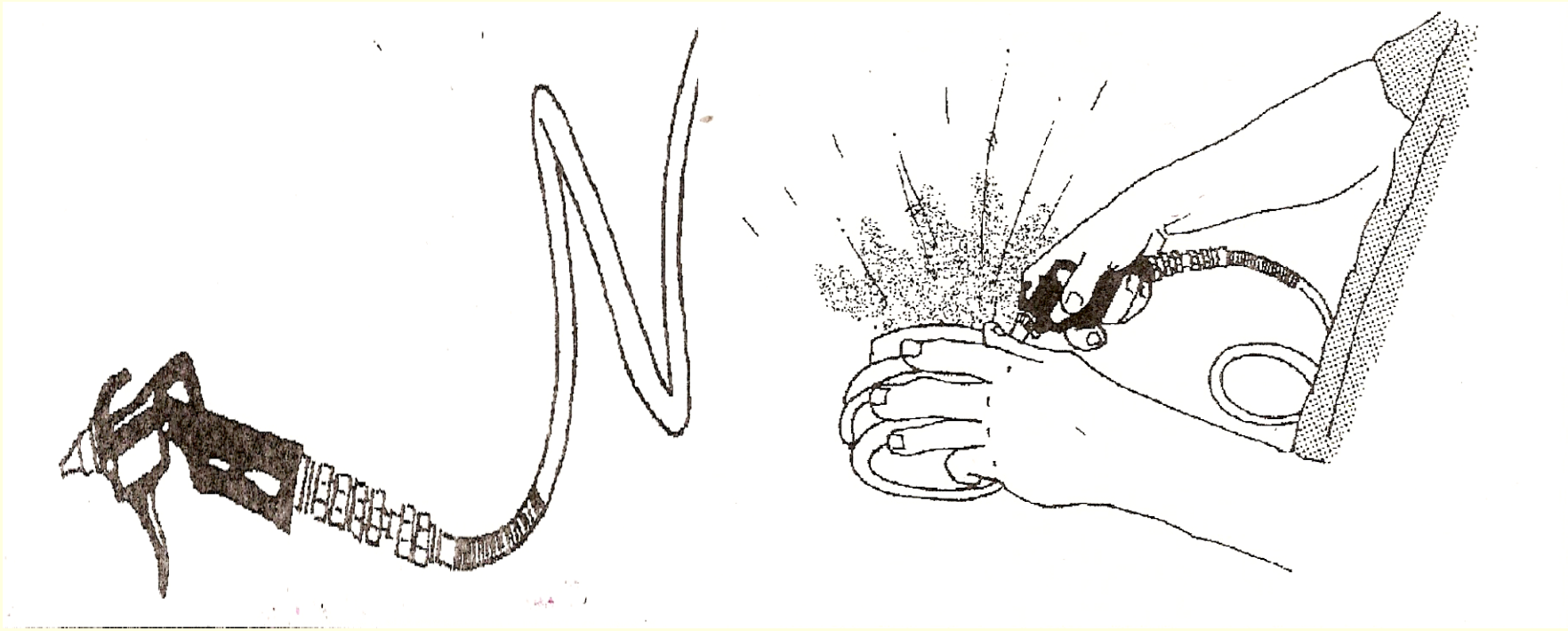
Sample handling

- Trays containing pulverised and unpulverised samples –



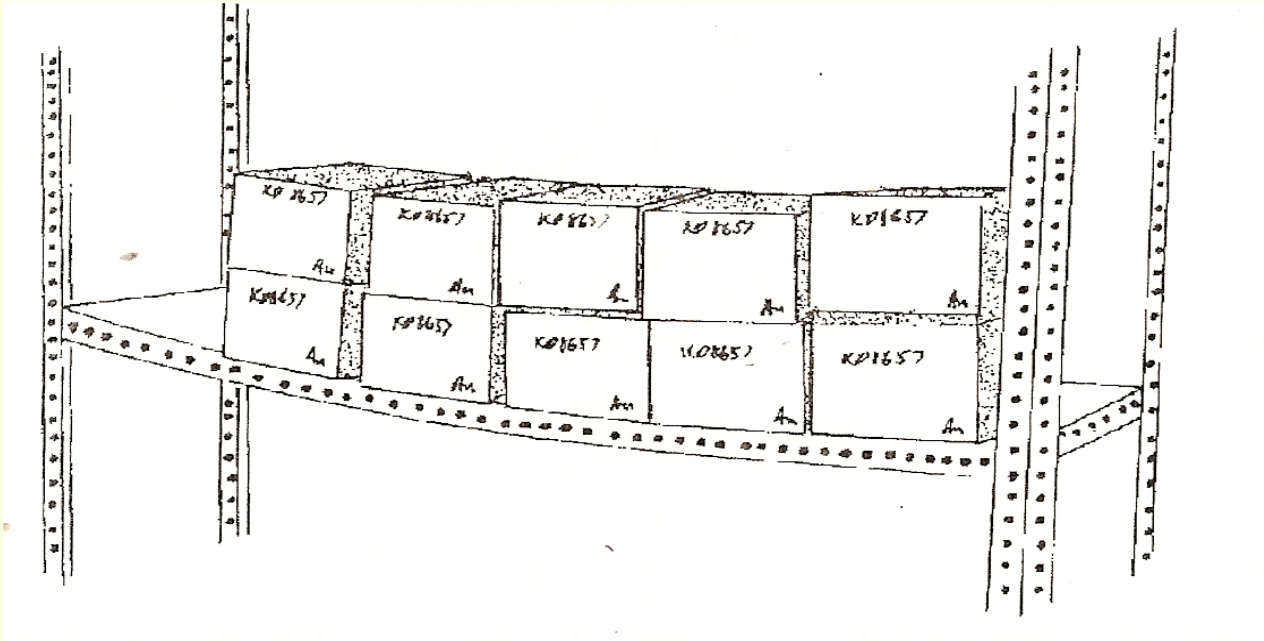
Housekeeping

- The bowls are then cleaned out using an air gun which removes remaining dust particles in the bowl
- Certain sample types are difficult to remove (e.g. clays) and may require a silica wash between samples to prevent contamination between samples



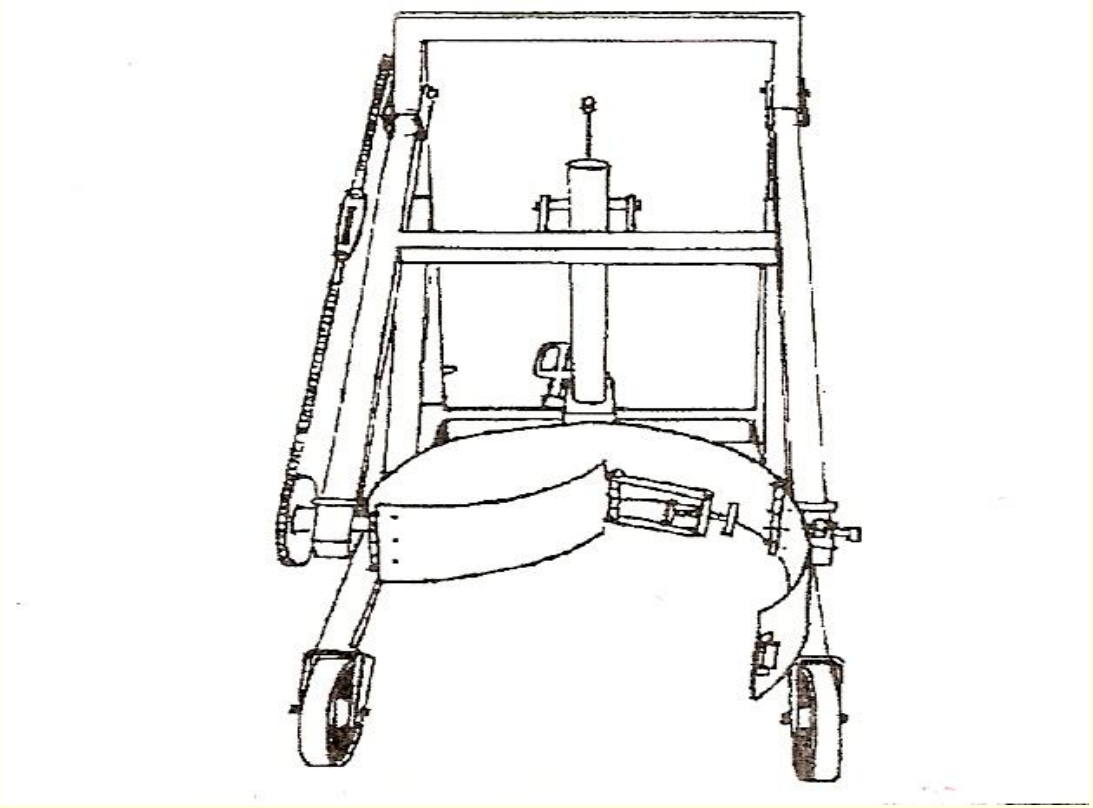
Sample storage

- When storing samples, sample information is important due to sample traceability and sample integrity:
  - Sample id (from sample #12340 - 12360), date, mining company, job numbers, required storage duration
- Samples usually stored for up to 3 – 6 months and longer if the client is prepared to pay for it!



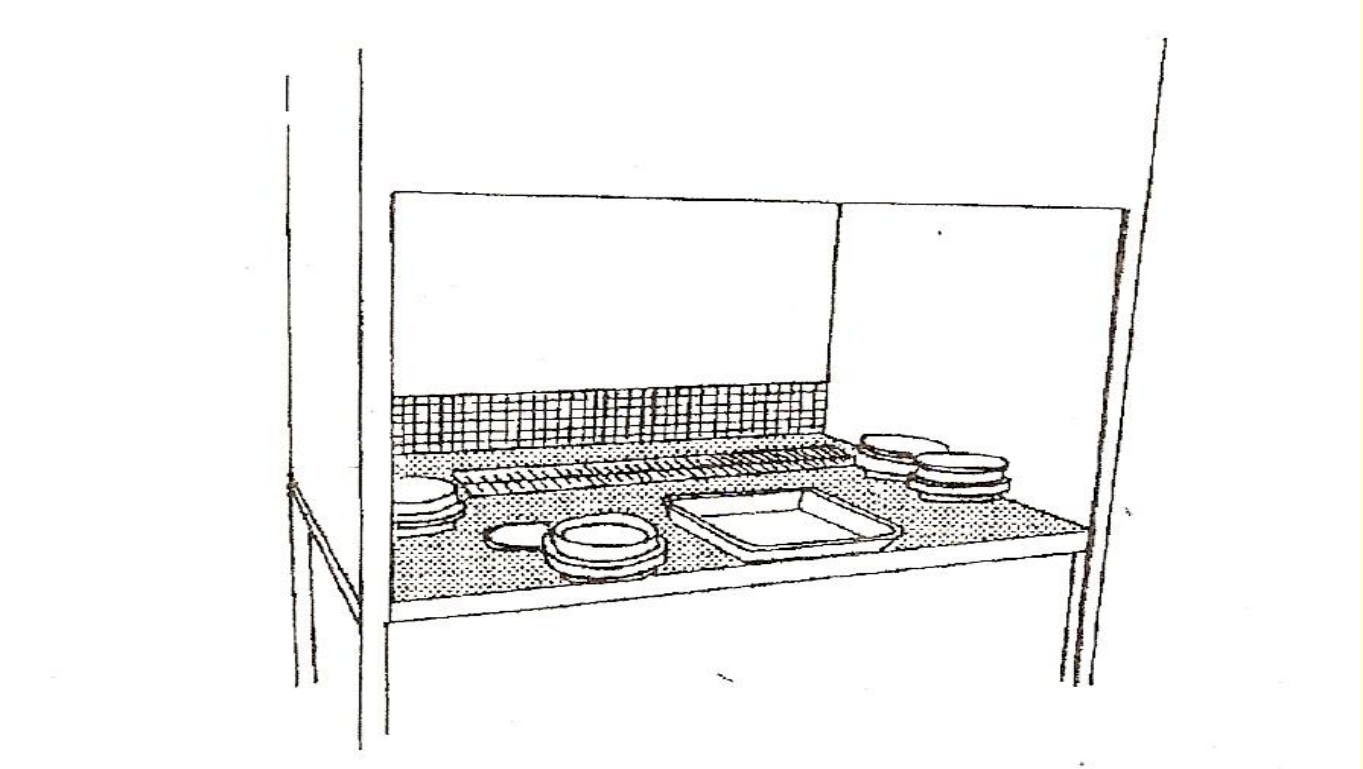
Safety - Waste sample handling

- Excess sample waste is collected in waste bins and disposed of using a licensed waste removalist
- Waste drums are maneuvered using trolleys due to their weight



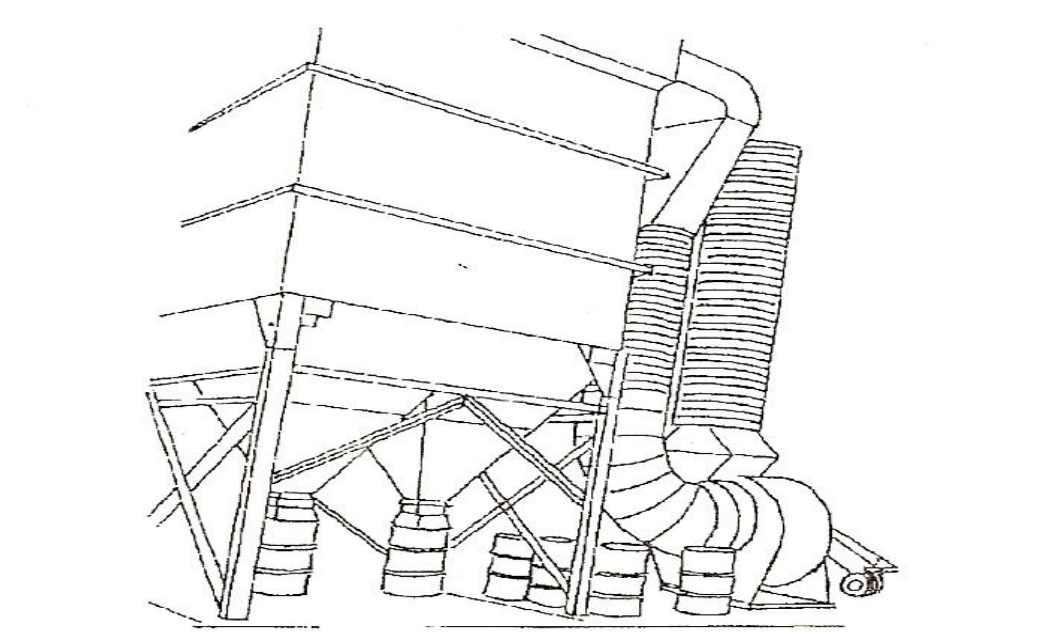
Safety – Dust hood

- Compulsory use of dust hoods ensure operators exposure to fine particulate matter is minimised
- PPE must still be worn!
- Dust hoods must be connected to a well maintained extraction system that is regularly cleaned out to prevent build up of dust particles



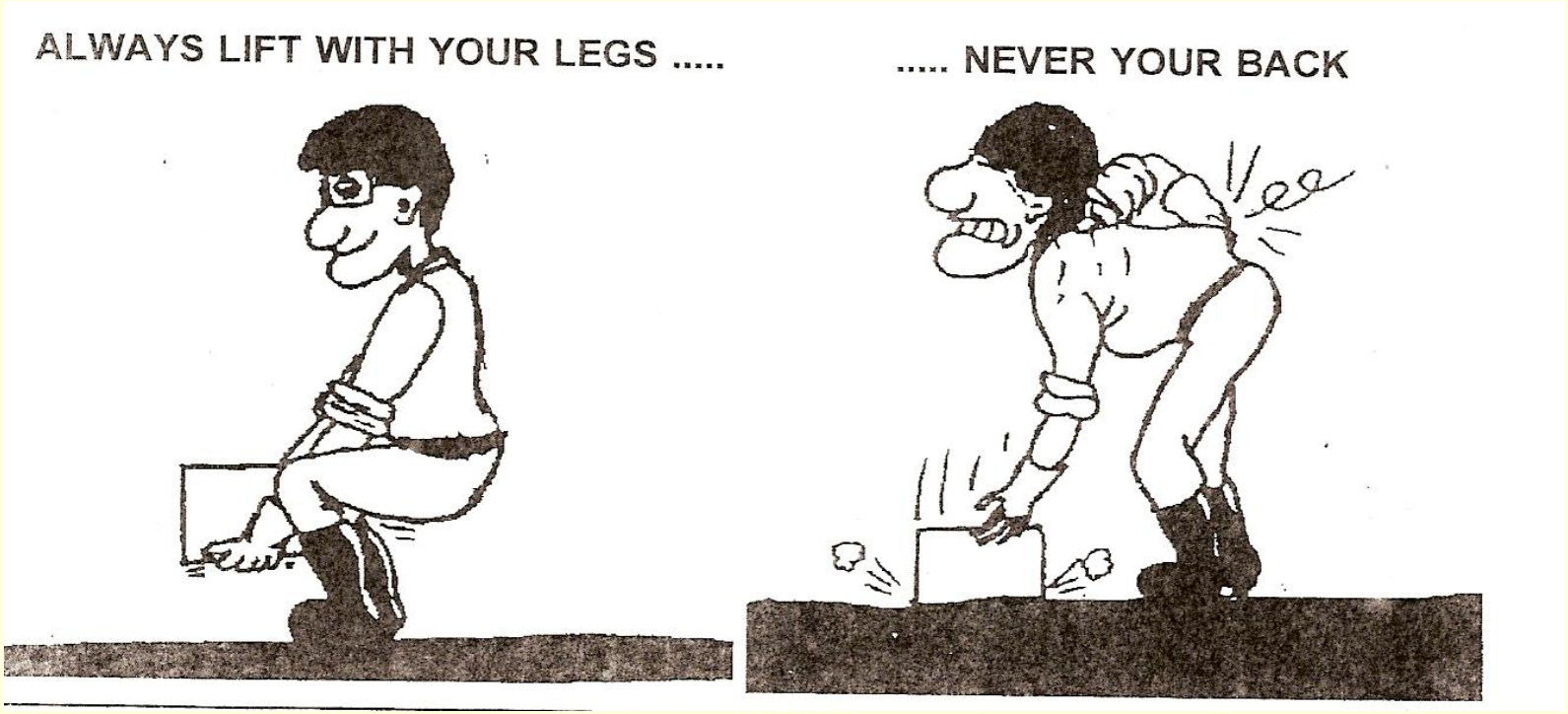
Safety in sample preparation

- Evolution of fine particulate matter is harmful to the long term health of sample preparation personnel
- Engineering controls as well as PPE are essential to minimise potential for harm
- Dust extraction systems are vital in all sample handling environments that involve particle size minimisation procedures



Safety in sample preparation

- Lifting techniques:
  - Bend your knees
  - Keep a straight back



Reference

Diagrams in this presentation were taken from:

- WMC Resources Ltd., Silver Lake Laboratory, Induction manual